



Sheet (5) Synchronous Machines

- 1) A **3- ϕ** , Y-connected, wound rotor synchronous generator rated at 10 KVA, 230 V, 60 Hz has the following parameters, $X_s = 2 \Omega$ / phase and $R_s = 0.5 \Omega$ /per phase. The generator is connected to infinite bus. Calculate the percent voltage regulation at full load with 0.8 lagging power factor, 0.6 leading power factor and unity power factor.
- 2) A 230 V, **3- ϕ** , Y-connected wound rotor synchronous generator gives on open circuit, e.m.f of 230 V, for afield current of 0.38 A. The same field current on short circuit causes an armature current of 12.5 A. The armature resistance measured between two lines is 1.8Ω . Find the regulation for the current of 10 A at 0.8 lagging and 0.8 leading power factors.
- 3) A 230 V, **3- ϕ** , Y-connected wound rotor synchronous motor has $X_s = 3 \Omega$ / phase and $R_s = 0.25 \Omega$ /phase. The motor operates on load such that the power angle is -15° , and the excitation is so adjusted that the internally induced voltage is equal in magnitude to the terminal voltage. Determine:
 - a) The armature current.
 - b) The power factor of the motor.

Best wishes
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